جامعة النصر_كلية الحاسوب وتقانة المعلومات

معالجةالصور الرقمية

digital image processing

المحاضرة الثانية

مقدمة

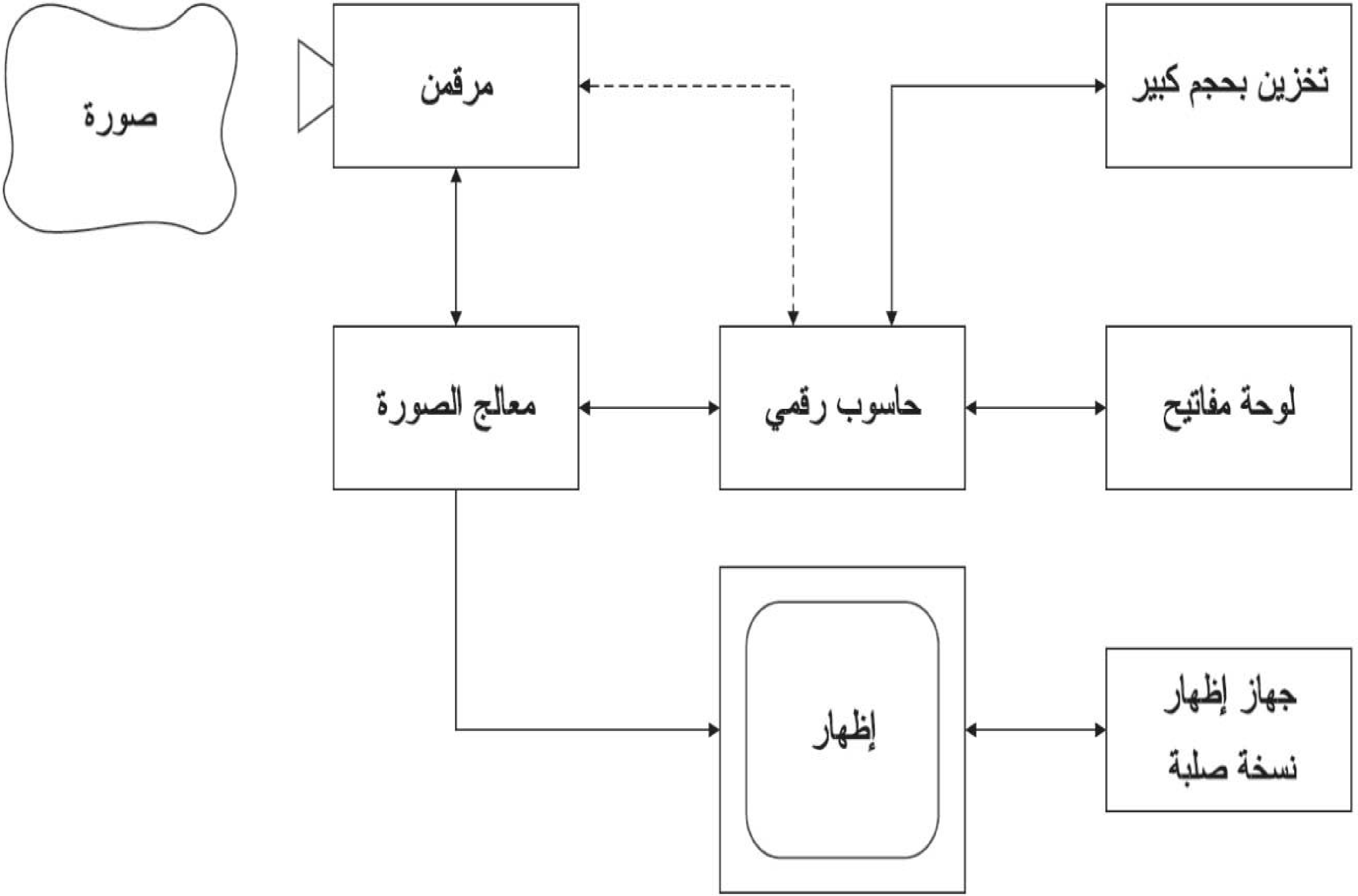
أهمية الصور

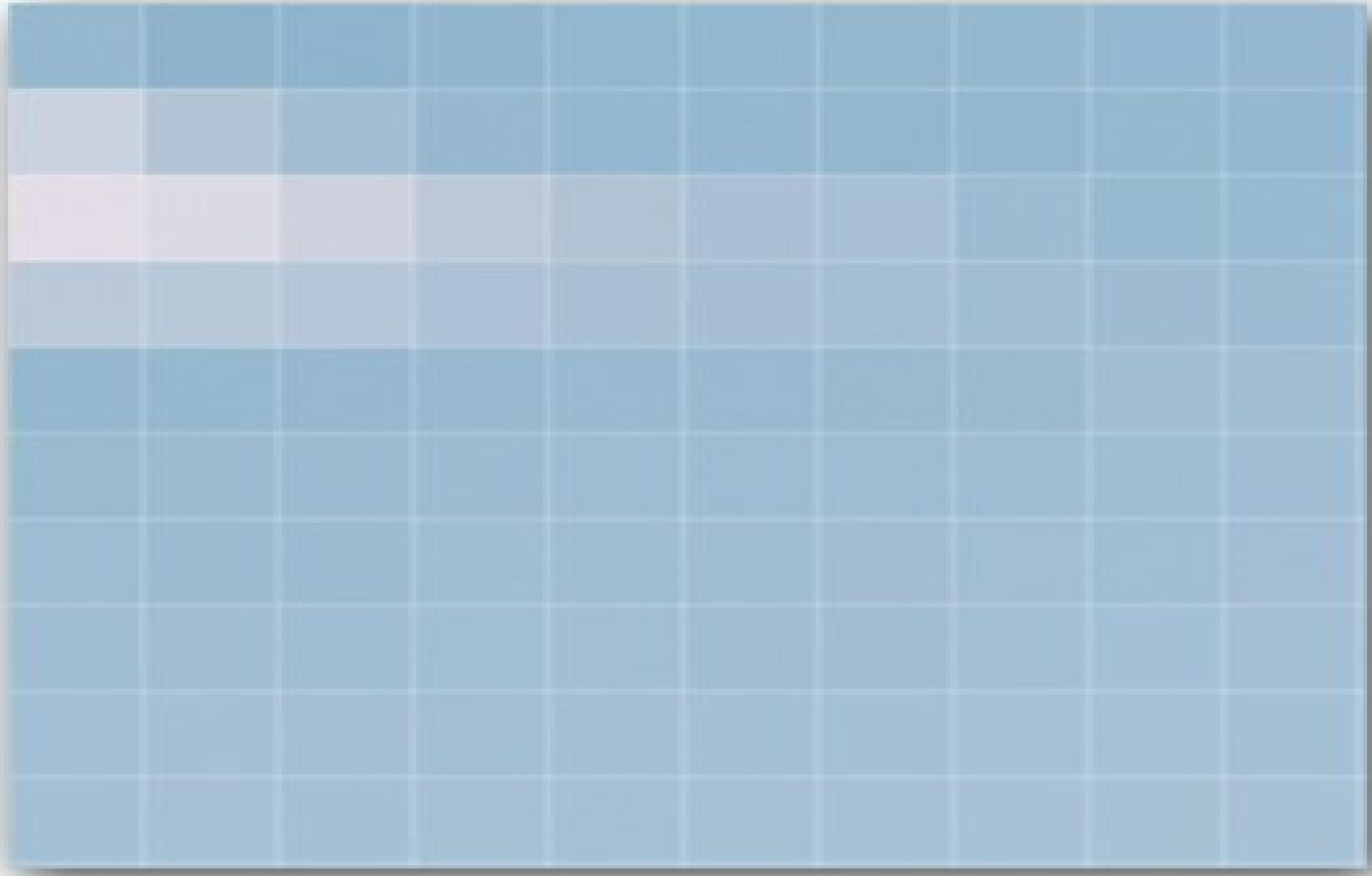
الصورة الرقمية



توضيح الاحداثيات X و Y

عناصر نظام معالجة الصور الرقمية


صورة
مرقمن
تخزين بحجم كبير
معالج الصورة
حاسوب رقمي
لوحة مفاتيح
إظهار
جهاز إظهار
نسخة صلبة



انواع الصور الرقمية



انواع الصور الرقمية



انواع الصور الرقمية



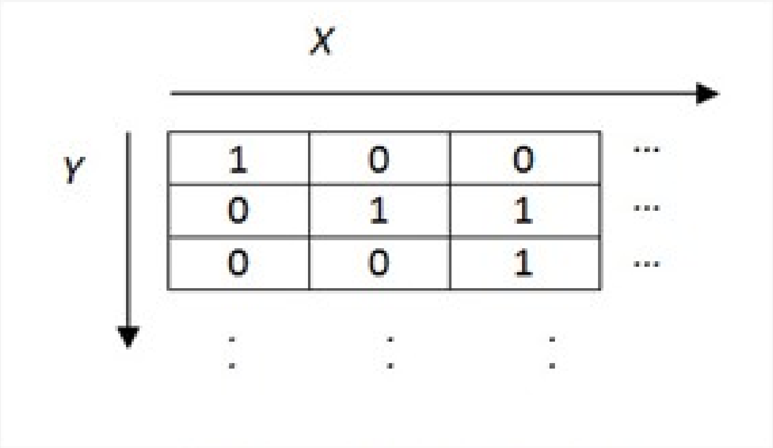






مفهوم الوان الصور حسابياً

2^1 -



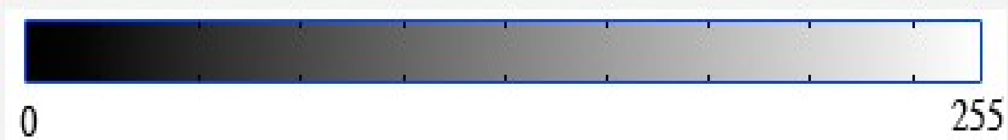
مصفوفة ثنائية الأبعاد تمثل الصورة الثنائية في الكمبيوتر

مفهوم الوان الصور حسابياً

[illegible] Gray-scale image , [illegible] 2^8 [illegible] 256 , [illegible]

[illegible] 255 - [illegible]

[illegible]



الدرجات اللونية بين الاسود والابيض

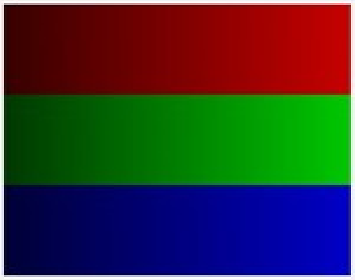
الشكل التالي , يوضح مصفوفة تمثل الصورة الرمادية gray-scale image ونلاحظ ان كل بكسل ممكن ياخذ قيمة لونية من 0 الى 255

X →

Y ↓

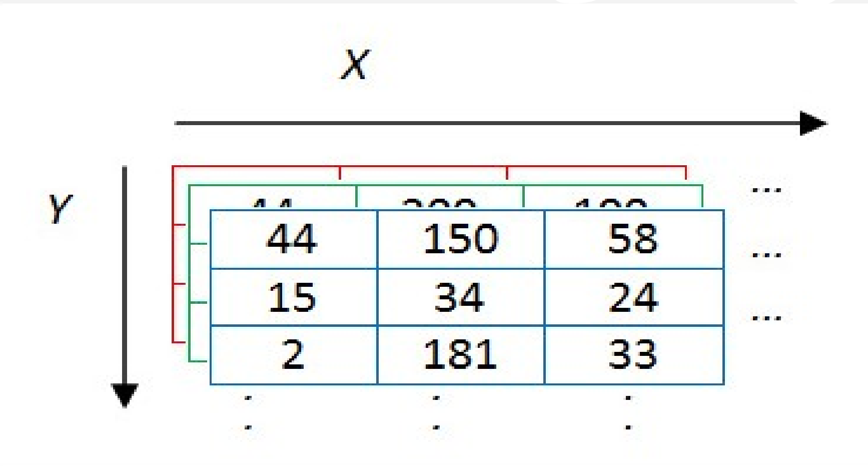
44	200	199	...
15	180	255	...
2	181	33	...
:	:	:	

مفهوم الوان الصور حسابياً



الالوان الاساسية (RGB)

ثنائية البعد) , كما في الشكل التالي



تمثيل الصورة الملونه على شكل مصفوفة ثلاثية الابعاد

Basic Relationships Between Pixels

- Neighborhood
- Adjacency
- Connectivity
- Paths
- Regions and boundaries

Neighbors of a Pixel

- Any pixel p*(x, y)* has two vertical and two horizontal neighbors, given by

  $$(x+1, y), (x-1, y), (x, y+1), (x, y-1)$$

- This set of pixels are called the 4-neighbors of P, and is denoted by $N_4(P)$.

- Each of them are at a unit distance from P.

Neighbors of a Pixel (Contd..)

- The four diagonal neighbors of p(x,y) are given by,

$(x+1, y+1), (x+1, y-1), (x-1, y+1), (x-1, y-1)$

- This set is denoted by $N_D(P)$.

- Each of them are at Euclidean distance of 1.414 from P.

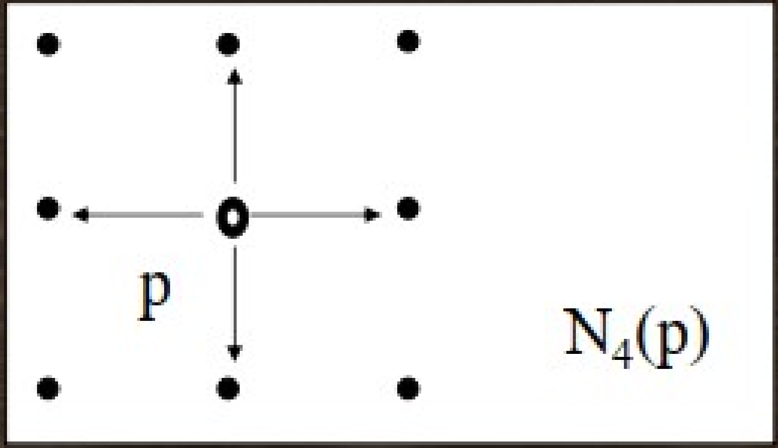
Neighbors of a Pixel (Contd..)

- The points $N_D(P)$ and $N_4(P)$ are together known as 8-neighbors of the point P, denoted by $N_8(P)$.
- Some of the points in the N_4, N_D and N_8 may fall outside image when P lies on the border of image.

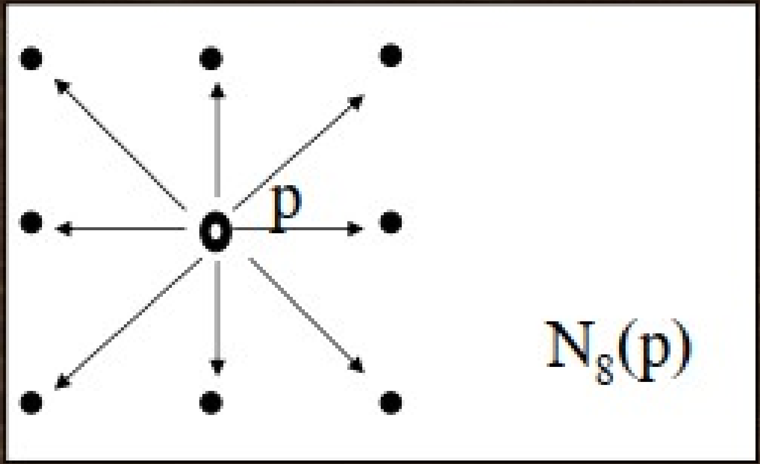
Neighbors of a Pixel (Contd..)

Neighbors of a pixel

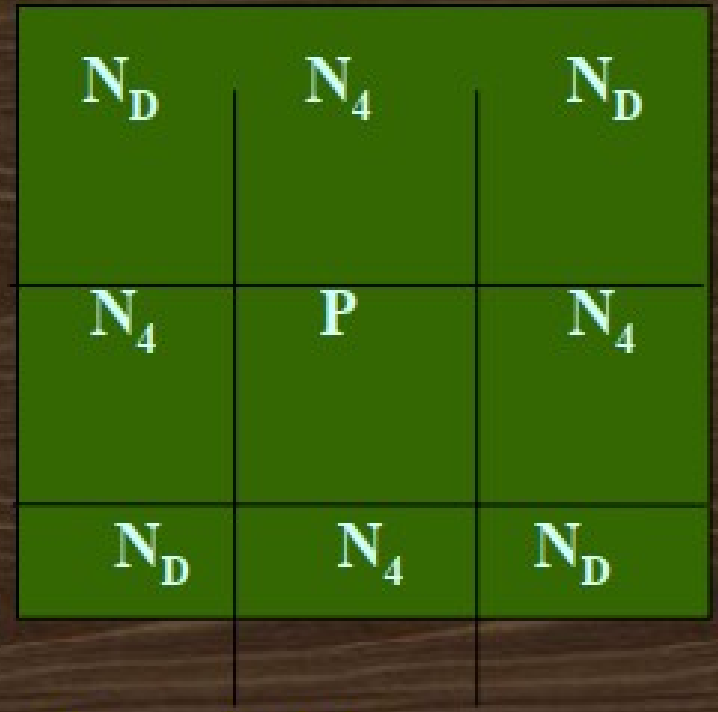
a. 4-neighbors **of a pixel p are its vertical and horizontal neighbors denoted by $N_4(p)$**



b. 8-neighbors **of a pixel p are its vertical horizontal and 4 diagonal neighbors denoted by $N_8(p)$**



Neighbors of a Pixel (Contd..)



- N_4 - 4-neighbors
- N_D - diagonal neighbors
- N_8 - 8-neighbors (N_4 U N_D)

Adjacency

- Two pixels are connected if they are neighbors and their gray levels satisfy some specified criterion of similarity.

- For example, in a binary image two pixels are connected if they are 4-neighbors and have same value (0/1).

Adjacency (contd.)

- Let V be set of gray levels values used to define adjacency.
- 4-adjacency: Two pixels *p* and *q* with values from V are 4-adjacent if q is in the set $N_4(p)$.
- 8-adjacency: Two pixels *p* and *q* with values from V are 8-adjacent if q is in the set $N_8(p)$.
- m-adjacency: Two pixels *p* and *q* with values from V are m-adjacent if,
  - q is in $N_4(P)$.
  - q is in $N_D(p)$ and the set [$N_4(p) \cap N_4(q)$] is empty (has no pixels whose values are from V).

Connectivity :

To determine whether the pixels are adjacent in some sense.

Let V be the set of gray-level values used to define connectivity; then Two pixels p, q that have values from the set V are:

a. 4-connected, **if q is in the set $N_4(p)$**

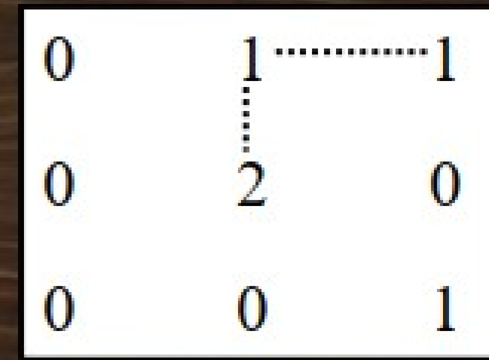
b. 8-connected, **if q is in the set $N_8(p)$**

c. m-connected, **iff**

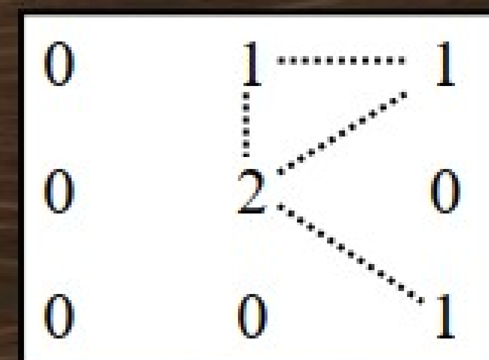
   i. **q is in $N_4(p)$ or**

   ii. **q is in $N_D(p)$ and the set $N_4(p) \cap N_4(q)$ is empty**

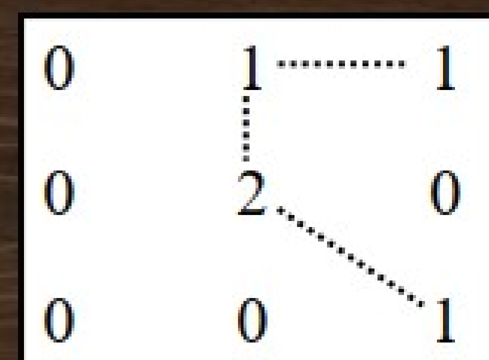
$V = \{1, 2\}$



a.



b.

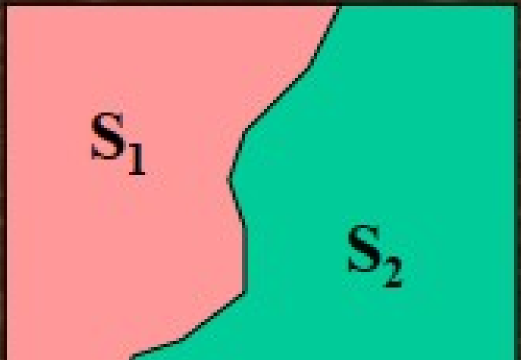


c.

Adjacency/Connectivity

- **Pixel p is *adjacent* to pixel q if they are connected.**

- **Two *image subsets* S_1 and S_2 are adjacent if some pixel in S_1 is adjacent to some pixel in S_2**



Paths & Path lengths

- A *path* from pixel p with coordinates (x, y) to pixel q with coordinates (s, t) is a sequence of distinct pixels with coordinates:

  $(x_0, y_0), (x_1, y_1), (x_2, y_2) \ldots (x_n, y_n)$,

  where $(x_0, y_0)=(x, y)$ and $(x_n, y_n)=(s, t)$; (x_i, y_i) is **adjacent** to (x_{i-1}, y_{i-1}) $1 \leq i \leq n$

- Here n is the *length* of the path.

- We can define 4-, 8-, and m-paths based on type of adjacency used.

Regions and Boundaries

- A subset R of pixels in an image is called a *Region* of the image if R is a connected set.
- The *boundary* of the region R is the set of pixels in the region that have one or more neighbors that are not in R.
- If R happens to be entire Image?